THE UNIVERSITY OF ALBERTA

INTER-INDUSTRY EARNINGS DIFFERENTIALS

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF ARTS

DEPARTMENT OF ECONOMICS

EDMONTON, ALBERTA

Fall, 1972

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Inter-Industry Earnings Differentials submitted by G. Anthony Glynn in partial fulfilment of the requirements for the degree of Master of Arts.

ABSTRACT

Given that considerable inter-firm and inter-industry wage differentials in fact exist, much empirical work has been undertaken to discover the factors influencing these differentials. A majority of these studies have tried to explain changes in these differentials over time rather than to explain the levels of these differentials as they existed at points in time.

This study will take the latter approach although previous studies will, of course, be used as reference both to their methods and results.

ACKNOWLEDGEMENTS

I wish to thank my supervisor, Professor B.R. McKellips, for his guidance and assistance throughout the writing of this thesis.

I would also like to thank Sharman Mc Kinnon for her aid in preparing this manuscript and for her encouragement while the work was in progress.

TABLE OF CONTENTS

ABSTRACT iii

ACKNOWLEDGEMENTS iv

TABLE OF CONTENTS v

LIST OF TABLES vi

INTRODUCTION 1

CHAPTER I. THE BASIC FRAMEWORK 15

CHAPTER II. SOME MODIFICATIONS: INTRODUCTION OF THE OVERTIME VARIABLE 32

CHAPTER III. ROLE OF EMPLOYMENT CHANGES REINVESTIGATED . 44

CHAPTER IV. CONCLUSIONS 56

BIBLIOGRAPHY 59

APPENDIX 62

LIST OF TABLES

TABLE A. REGRESSION RESULTS 23

TABLE B. REGRESSION RESULTS 29

TABLE C. REGRESSION RESULTS 35

TABLE D. REGRESSION RESULTS 39

TABLE E. INDUSTRIES RANKED BY AVERAGE HOURLY EARNINGS .. 40

TABLE F. INDUSTRIES RANKED BY OVERTIME WORKERS 41

TABLE G. ANNUAL AVERAGE PERCENT UNEMPLOYMENT RATE FOR CANADA, 1955-51 48

TABLE H. REGRESSION RESULTS 50

INTRODUCTION

In the long run, according to the theory of perfect competition, all workers of a given skill will receive equal wages. That is to say, that any industry will pay the same price for a given grade of labour as any other industry hiring in the same location. It is necessary to qualify this statement by mentioning the fact that differences in non-pecuniary factors may exist between different industries and locations. If these differences are ignored, real wage differences among industries will reflect only the differences in the skill mix, in the long run.

The theory thus implies that money wage differentials for a given skill, even among locations, will be no greater than can be explained by the differences in the cost of living between the locations and the other non-pecuniary factors involved. Thus, in the long-run, there will be no association between the wage level of an industry and the quantity of the factors of production employed by that industry. This is in direct contrast with short-run situations where inelasticities of labour supply coupled with increases in labour demand lead to increases in wages, which forges a direct and positive association between wage changes and changes in the quantities of labour employed.

Given that the amount of labour employed and the average wage rate paid can be determined for any industry by the intersection of the industry's labour supply and

demand curves, and that wage differentials other than those attributable to differences in skill and other non-pecuniary factors exist in the short-run, the perfect competitive hypothesis predicts that labour mobility will lead to the long-run situation where labour of a given skill receives equal remuneration. The theory says that in the long-run labour will move from low wage to high wage industries, thus effecting shifts in the supply curve of labour and from this that equality of wages will finally result.

From this then one can see that according to the theory of perfect competition the long-run and short-run situations vary but are consistent with each other nevertheless. If, however, there are any restrictions on the mobility of labour, inter-industry wage differentials will persist. In real life considerable inter-firm and inter-industry wage differentials of course exist. Part of the reason is that labour mobility is far from perfect and far from being as efficient as suggested by the theory.

The volume of literature which has been devoted to the topic of migration is one indication that labour markets are far from perfect and that adjustment of labour supply to changes in demand is not instantaneous. Some of the factors which inhibit mobility are insufficient knowledge of job opportunities and openings, uncertainty regarding not only such topics as wage rates and working conditions, but also housing conditions and, of course, the influence of local ties.

The topic has been treated fairly extensively[1] and care has been taken to include both the economic and psychic costs of migration. The fact that such impediments exist leads to a blurred and delayed response and the length of such lags in response will vary with the character of the labour market in question, the educational system and on such factors as the efficiency of manpower offices and exchanges.

Given that perfect adjustment does not take place, not only between regions but also between industries, it has thus been recognized that inter-industry differences in wages will persist. Accordingly a majority of empirical research has been concentrated on discovering factors which account for changes in these inter-industry wage differentials. This is somewhat surprising, in that little research, by comparison at least, has been undertaken to explain the existence of these same differentials.

Economic theory has a lot to say regarding the firm's demand for labour under varying product market conditions. For example, the monopolist will hire units of labour up to the point at which the price of labour is equal

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[1] For example see T.J. Courchene, "Interprovincial Migration and Economic Adjustment", Canadian Journal of Economics, November 1970; J. Vanderkamp, "Interregional Mobility in Canada : A Study of the Time Pattern of Migration", Canadian Journal of Economics, August 1968; L. Sjaastad, "The Costs and Returns of Human Migration", Journal of Political Economy, October Supplement, 1962.

to the Marginal Revenue Product of labour (MRP_L). The fact that the MRP_L depends on the form and parameters of the production function and the quantities of the other factors of production in use as well as on the form and parameters of the product demand curve, makes it possible to determine the firm's demand for labour at any given wage level. It has, however, been found more difficult to determine the labour supply curve due mainly to the fact that non-economic factors may enter into the argument.

One of the earliest attempts to grapple with the problem of wage determination and specifically with the phenomena of inter-industry wage differentials was carried out by Dunlop[1] and his hypothesis can readily be interpreted in terms of theoretical analysis. Increases in the productivity of labour and in output result in an increase in the industry's demand for labour which tends to raise the wage rate at the equilibrium point. It is through this mechanism, whereby productivity increases which are associated with expanding output, necessitate higher wage rates to attract a larger labour force, that Dunlop sees his close connection between productivity and wages. This mechanism, however, presupposes a type of supply elasticity which is not necessarily associated with industries in which greater

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[1] J.T. Dunlop, "Productivity and the Wage Structure" in Income, Employment and Public Policy: Essays in Honour of Alvin H. Hansen (New York, WW Norton and Co. Inc., 1948).

than average productivity gains occur.

Dunlop further postulated that if labour costs represent only a small proportion of total costs there will be less resistence on the part of employers to grant wage increases since these wage increases will result in only a relatively small reduction of profits or in only a relatively small increase in the price of the product. He then recognized that the more monopoly power on the product market which the employer possessed the more likely he was to pass on the wage increase in the form of product price increases.

From this one can see that the important factors influencing wages were productivity, output, labour costs and concentration in the product market. Dunlop's proposition thus represents a catalogue of factors which were considered as the most important determinants of the movements in the inter-industry wage structure.

It has been noted that all of the factors considered by Dunlop relate to the influence of shifts in the demand for labour with no consideration given to the influence of shifts in the supply of labour. Supply curves in different industries could be expected to be influenced by such an obvious factor as union strength and the omission of such supply factors seems a mistake.

The hypothesis put forward by Dunlop has been subjected to empirical tests by a number of writers. Ross

and Goldner[1] for example applied simple correlation analysis to U.S. industrial data for 1933-46 and found a positive correlation between changes in average earnings and changes in employment but they failed to find any simple association between changes in earnings and labour costs. They also tended to believe that industries with oligopolistic market structures showed larger wage increases than the more competitive industries.

J.W. Garbarino[2] took the period 1923-40 and examined selected industrial groups in the U.S. by means of simple rank correlation. His findings were that the movements in the inter-industry wage differentials can be explained by productivity, concentration and unionization. He therefore corrected the demand factor bias of the Dunlop hypothesis to some extent at least.

In a further study of the U.S., Eiseman[3] found a positive correlation between changes in wages and

a) the original level of wages,

b) changes in production,

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[1]A.M. Ross and W. Goldner, "Forces Affecting the Inter-Industry Wage Structure", Quarterly Journal of Economics, May 1950.

[2]J.W. Garbarino, "A Theory of Inter-Industry Wage Variation", Quarterly Journal of Economics, May 1950.

[3]D.M. Eiseman, "Inter-Industry Wage Changes 1937-47", Review of Economics and Statistics, November, 1956.

c) changes in employment,

d) labour costs as a proportion of total costs.

The introduction of the employment variable is not too surprising in that in the short-run even the competitive hypothesis explains variations in employment and earnings as due to wages rising in industries where employment is expanding because of short-run inelasticities of labour supply and falling in industries where employment is shrinking because of labour immobility.

Due to the fact that labour markets are not perfect and adjustments are not instantaneous (as mentioned above) there may well be lags both in the response of employment to changes in earnings and also in the response of earnings to changes in employment. For example, it may well be the case that industries which are expanding employment (for whatever reasons) are well placed to fill their labour requirements at the existing rates of pay. This may be due to the fact that these industries are already among the high paying industries or due to the fact that the overall level of unemployment in the economy is high so that labour is available and there is no need to bid up its price.

Thus there may be no association between employment changes and wage changes. The continued prosperity of the industry may, however, induce labour to seek wage increases which may be granted. So there may be a lagged relationship between employment and earnings changes.

In their study of the English economy for the 1948-59 period Phelps Brown and Browne[1] found no association between changes in productivity and changes in earnings but they came up with a positive relationship between changes in earnings and the concentration of employment which they defined as the proportion of the industry's employment given by the three largest firms.

Finally Sylvia Ostry[2] in her study of thirty-six Canadian industries found that for the period 1945-56 both absolute and percentage wage increases tended to be highest in industries in which employment was expanding most rapidly and that the percentage wage increases tended to be greatest in those industries in which wages formed a small proportion of total costs. She further found that both the degree of unionism and degree of product market concentration were positively correlated with absolute increases in earnings.

Her results showed no association between wage changes and productivity changes and she summed up by saying that the most important determinants of wage changes among industries were the original level of earnings and changes in employment.

Although the majority of empirical studies have

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[1]E.H. Phelps Brown and M.H. Browne, "Earnings in Industries of the U.K., 1948-59", Economic Journal, Sept. 1962.

[2]S. Ostry, "Inter-Industry Earnings Differentials in Canada 1945-56", Industrial and Labour Relations Review, April 1959.

been devoted to explanations and accounts of factors which determine the changes in the inter-industry wage differentials, some studies have tried to explain the existence of these same differentials at selected points in time.

The studies quoted up to now have, while attemping to explain how the wage differentials changed over time, resorted to the use of the simple and rank correlation techniques to obtain their results. Such a procedure can be criticized because of the fact that simple correlation techniques do not separate the effects of individual factors. This makes it impossible to use statistical tests of significance unless it is the case that the factors which may influence the wage differentials vary independently of each other. Such independence is unlikely to be the case and the relationship between changes in wages and any one particular variable may be distorted by an offsetting influence of some other factor or factors.

It is partly for this reason that the use of multiple regression techniques have been used and an example of the use of this technique to determine inter-industry wage differences at a point in time is the study done by Masters[1] in which he tries to explain the level of wages in terms of a plant size variable which is the percentage of workers in

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[1]S.M. Masters, "Wages and Plant Size: An Inter-Industry Analysis", Review of Economics and Statistics, August 1969.

the industry in plants of over 100 employees, a concentration variable and a union variable. He then expanded his model to include the relative importance of labour and capital in the industry, on the grounds that the marginal productivity of labour will be positively related to capital-labour ratios.

His main results indicate that plant size is an important determinant of manufacturing[1] wages.

Masters' model was further expanded by Haworth and Rasmussen[2] to include variables describing worker characteristics. To account for these worker characteristics variables representing labour quality were added. These took the form of sex, and a measure of human capital which was in effect a corrected education variable.

The inclusion of worker characteristics increased the explanatory power of Masters' model by 25 percent, while the variables representing concentration and unionization exerted positive but insignificant influences on wages.

A study of note carried out by Johansen[3] concluded that one may expect not the changes in wage differentials but

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[1]His data were limited to manufacturing industries, so also must his results.

[2]C.T. Haworth and D.W. Rasmussen, "Human Capital and Inter-Industry Wages in Manufacturing", Review of Economics and Statistics, November 1971.

[3]Quoted in J. Kmenta, "Inter-Industry Wage Differentials in Australia 1947-54", Australian Economic Papers, June 1963.

the wage differentials themselves to be correlated with changes in productivity and that the level of the wage rate differential to be correlated with changes in employment.

Thus the role of employment changes is once more introduced and before leaving this brief survey of recent literature reference should be made to the study on wages and mobility carried out by the O.E.C.D.[1] in which the results of a large-scale investigation of the relation between wage rates and employment in ten countries is undertaken. The main conclusion is that there is no evidence of a strong systematic statistical relationship between changes in earnings and changes in employment among industries. The most obvious interpretation of these findings is that changes in wages have not played an important role in the allocation of labour between different industries. This is obviously in contrast with the traditional theory, which holds that increases in wages are often used by employers to attract or retain labour, and which has been the basic reason for the inclusion of a variable representing employment changes in many of the statistical studies quoted above.

The authors of the study, however, are quick to qualify this conclusion by stating that although the movements of labour have been predominantly wage-insensitive "additional evidence strongly suggests that

(i) the observed changes in the allocation of

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[1] O.E.C.D., Wages and Labour Mobility , Paris July 1965.

labour are often brought about by mechanisms other than changes in the wage structure, and

(ii) the observed changes in the wage structure are often brought about by forces other than those that allocate labour."[1]

The alternative mechanisms which the authors have in mind are brought about by the fact that financially motivated mobility may indeed be very important, but to the extent that it reflects such factors as economic security or opportunity for advancement or other fringe benefits, it may not lead to a rise in wage levels. Even where mobility is strictly motivated by financial considerations it may be in response to differences in wages in the existing structure as distinct from changes in them. Given these considerations then the wage-insensitivity observed in the study is deemed reasonable.

Rosenbluth[2] in a recent article has taken issue with these findings and he takes seventeen manufacturing industries in Canada and compares the time path of the monthly employment index with that of average hourly earnings of hourly rated production workers for the period 1951 to 1965. He presents his data in chart form and finds a remarkable degree of positive conformity and he concludes

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[1] Ibid, pp. 17.

[2] G. Rosenbluth, "Wage Rates and the Allocation of Labour", Canadian Journal of Economics, August 1969.

that the common trends of earnings and employment are the strongest evidence for the operation of a price mechanism.

He is however anxious to point out that the small changes in wage rates which his graphs show up make it hard to accept the hypothesis that wage rates influence labour supply which is what his conclusions might lead one to think. All that he claims is "that relatively small wage differentials play a role in the re-employment decisions of persons who, for one reason or another, have already left or are about to leave their present employment."[1]

Given that much study has been devoted to the problem of inter-industry wage differentials, not only because of their existence in reality but also because of the belief that labour supply must be made more responsive to shifts in demand, the remainder of this paper will attempt to explain such differentials as they existed in Canada for the years 1957, 1962 and 1969.

The concern that automation has led to much structural unemployment which in turn places much emphasis on labour supply, and the possibility of wage quidelines and/or incomes policies being implemented places the role of wage differences at the front of economic thinking. Specifically, the question being asked is whether such policies, by making wage differentials more rigid, would hinder the adaptation of supply to changes in demand.

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[1] Ibid., pp. 581.

Although this topic is of major concern and importance, little attempt will be made to resolve it in this essay. Reference to it will be by way of a side issue; the main purpose will be to explain the industrial wage levels as they existed in the selected years.

To date all references have been to wage differentials between industries, and the studies that have been undertaken to determine the factors directly influencing such differentials. In most of these studies the data used have been average earnings rather than average wage rates and the empirical results reported in the following chapters will also make use of similar data. This procedure is dictated by the way in which the industrial wage data are compiled and presented.

This, of course, makes a difference in that the total hours of work recorded include overtime hours and the total wages reported include straight-time wages and overtime wages as well as such items as payments to persons absent because of holidays, sickness etc. For clarity therefore, the results to be reported will be for inter-industry earnings differentials and the use of the term wage differentials will be avoided lest one construes it to mean differences in rates per hour which, of course, it does not.

CHAPTER I

THE BASIC FRAMEWORK

In this chapter the basic framework within which inter-industry earnings differentials will be studied is introduced, together with the variables by means of which these differentials will be explained.

The variables chosen represent supply factors in the form of worker characteristics as well as in the form of the organizational strength of each industry's work force. Demand factors will also be represented primarily in the form of employment changes and a variable representing the proportion of total costs devoted to labour. From this it is clear that the procedure adopted by previous papers into this topic have been taken into account in the formation of the framework as well as in the choice of variables to be used.

The framework is of the form:

$$W_i = a_0 + a_1E_i + a_2A_i + a_3M_i + a_4T_i + a_5U_i + a_6R_i + a_7L_i$$

the subscript i refers to the ith industry and

W_i = annual average hourly earnings of hourly rated workers;

E_i = the percent of employees by industry who completed 4-5 grades of secondary school;

A_i = the average age of employees in years;

M_i = the percentage of employees by industry who are male;

T_i = the percentage change in employment by industry for

the 5 year period centered on the year in question;

U_i = the percentage of total industry employment belonging to unions;

R_i = the percentage of total industry employment occuring in establishments of at least 200 employees;

L_i = the ratio of the total wages of production and related workers to the value of factory shipments.

The effects of labour characteristics on wages have been included by means of the variables E, A and M which represent labour quality. The E variable representing the number of years of schooling is included in keeping with the theory of human capital which states that higher levels of skill will increase worker productivity which reflects itself in a higher level of wages. In order to account for differences in human capital among industries a measure of worker productivity is required, and the most commonly used measure is median years of schooling. The E variable thus is included but it is to be noted that the variable ignores quality differences in the education received by individuals and to that extent it is mis-specified.

It should also be borne in mind that such a variable was available for the year 1961 only and so because of this data limitation the educational attainment of the industry's workers for 1961 was held to apply both in 1957 and in 1969.

The age of the work force is held to be a determinant of wages also due to the fact that experience tends

to be rewarded and experience necessarily comes with age. This variable was also limited to the census year of 1961 and a similar treatment has been applied to it.

It is generally recognized that men have higher incomes than women of similar age and educational achievements. This may be due to simple discrimination but it is also possible that many positions pay higher wages because of requirements of physical strength or discomfort which may preclude women. It may also be the case that higher male incomes reflect higher levels of on-the-job training or the desire of secondary workers (who tend to be female) to work in more pleasant surroundings.

Whatever the reason, since wage rates reflect these constraints one would expect higher wages in those industries in which males make up a large share of the labour force. On the other side of the picture, industries employing large numbers of female workers relative to male workers may pay lower wages to these female workers because discrimination itself may lower the opportunity costs for the female workers involved.

The inclusion of the employment variable is not to be unexpected given that much has been written on the relationship between wages and employment changes. The form of the variable was dictated by the current concern over the allocative role of wages to which reference was made in the introductory chapter. In that chapter it was noted that a lagged response of employment to changes in wages was the

traditional approach adopted and this form of the relationship is the one investigated in this chapter.

The union variable represented by U_i measures the degree of unionization among industries for the years in question. As noted previously, ever since Dunlop's study much consideration has been given to the role of union bargaining strength as a determinant of industrial wage levels. It has been held that the stronger the union is the more likely it is to ask for and obtain wage increases.

High wages, however, could result from the unionization of profitable industries or from managerial attempts to prevent such organization. By the same token less profitable industries might pay lower wages because such a threat of organization might be less or because management might be less willing to pay to keep the unions weak.

It may also be helpful to note that unionism and concentration in the product market are closely related. In unconcentrated industries strong unions may be able to obtain high wages but it should be noted that in industries which are already concentrated wages may be high and the unions may add little, if anything. So a situation can be envisaged in which high wages in unorganized but concentrated industries may result from the threat of unionism and consequently both unionism and concentration represent the same force.

From this then one would be led to believe that the combined effects of the two may be less than the sum of the two effects when they are treated separately. A case can then be made for not including both variables or alternatively for including both variables and an interaction variable which accounts for the combined effect of the two forces.[1] This interaction variable takes the form U.C (C representing concentration) and the results have shown that it takes on a negative sign which seems to suggest that for a given degree of union strength in an industry a greater degree of concentration may yield a smaller rate of increase in wages. Thus contrary to popular belief a union's ability to obtain wage increases may be hindered rather than helped by the presence of greater concentration in the product market.

Not all theorists have accepted the basic proposition that the ability of a union to achieve wage increases is facilitated by the presence of a more monopolistic product market. Albert Rees[2], for one, has questioned this proposition on the grounds that because of data limitations most studies have been confined to manufacturing

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[1]See for example L.W. Weiss, "Concentration and Labour Earnings", American Economic Review, March 1966.

[2]Quoted in H.M. Levinson, "Unionism, Concentration and Wage Changes; Towards a Unified Theory" in Industrial and Labour Relations Review, January 1967.

industries where it is the case that almost all strong unions deal with concentrated industries. This, he claims, has led theorists to believe that this is so for the whole economy, which he says is untrue.

He points out that in such industries as coal mining, entertainment and building construction there is a high degree of union organization coupled with conditions of competition in the product market, yet these industries have not been lacking a higher relative wage than otherwise might be the case.

Unions in general seem to possess greater bargaining power where they are the source of monopoly power on the product market as for example with coal mining and construction, than where the market power would exist without them as for example with automobiles and steel.

The variable R, which represents employment concentration in an industry, may be seen as a plant size variable following the recent work of Masters.[1] Although the significance of plant size as a determinant of industrial wages has been open to argument, empirical studies seem to verify the fact that larger plants exhibit wage and benefit differentials.

On the one hand the wage-benefit differentials offered by the larger plants permit these higher paying plants to attract and to hold a higher quality of labour,

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[1] Op. cit.

so in effect, they receive a better work force in return for their higher wages. On the other hand, the disadvantage arising from the more impersonal and confining aspects of large establishments necessitate the payment of higher levels of compensation in order to attract and to hold a given quality of labour.

The obvious connection (in theory at least) between plant size and monopsony power in the labour market needs to be kept in mind. Monopsony theory predicts that in a labour market area a firm with significant monopsony power will be able to exert a depressing effect on the wage scales for any particular type of labour which it hires and will thus be able to achieve a work force quality differential which is greater than its wage-benefit differential.

Whether, in fact, plant size and monopsony power are closely related depends on the labour market area in which the plant operates and obviously the bigger the area the less the monopsony power is likely to be. It also depends on the individual establishment's demand for particular types of labour in the area and on the possibilities of substitution between various types of labour as well as between factors of production.

The ratio of labour costs to the value of factory shipments has been introduced because of the role it has been assigned in traditional theory. The theory suggests that if labour costs represent only a small proportion of

total costs there will be less resistence on the part of employers to satisfy the claims for higher wages, since any such increase will result in a relatively small reduction of profits or alternatively in a relatively small increase in the price of the product.[1]

This variable has often been represented by taking total wages as a ratio of total value added in the industry. While such a procedure was open for use, the value of factory shipments was chosen since the value of factory sales would appear to be a better working guide both for management and labour than the value added concept.[2]

These were the variables chosen to explain the inter-industry earnings differentials and the basic framework was tested using cross-sectional data for 36 Canadian industries for three different years. The years were 1957, 1962 and 1969. The data used are to be found in Tables 1-8 in the Appendix at the back and the regression results are shown in table form on the next page.

The results obtained in equation (1) (which

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[1]The final outcome will obviously depend on the degree of product market monopoly power possessed by the firm (industry) as well as on the price elasticity of demand for the product.

[2]This seems a reasonable conclusion since the value of sales is a commonly known and available statistic and would be more likely to be the basis of decisions (especially on the labour side) than the alternative.

TABLE A - REGRESSION RESULTS

t values ( ) d.f. 9[a]

Eq.	$\bar{R}^2$	Constant	E	A	M	T	U	R	L
(1)	.8065	.6739	.0364	.0021	.0052	.0237	.0013	.0047	- 1.7357
		(.8868)	(2.7960)	(.0917)	(2.2442)	(1.3882)	(.3441)	(1.8263)	(1.8218)
(2)	.8845	.2346	.0423	.0022	.0095	- .0214	.0051	.0082	- .0921
		(.3106)	(3.4417)	(.0993)	(4.4947)	(2.9633)	(1.3523)	(3.5124)	(.1037)
(3)	.7566	2.8863	.0641	- .0473	.0107	- .0051	.0113	.0038	- 3.3019
		(1.8721)	(2.6765)	(1.0008)	(2.1890)	(.3235)	(1.4350)	(.7626)	(2.4742)

[a]The number of observations was limited to seventeen due to the limitation of union data to twenty observations and non-availability of labour costs and plant size data for mining and construction.

applies to 1957) indicate that the only significant[1] variables are the education variable, E, and the Male/Female ratio variable M. Thus it appears that the only factors exerting a major influence on the 1957 level of industrial earnings are two factors which both account for labour force quality. It is also noted that the variables contained in equation (1) explain some 80 percent of the variance of earnings among industries.[2]

These findings are supported by the results obtained from equation (2) which deals with the year 1962 where again E and M are significant. In addition the variable T, representing the percentage change in employment over the 1960-64 period, is significant but displays a negative sign. This seems to imply that contrary to traditional theory, changes in employment had a depressing effect on earnings.

The plant size variable, R, is also significant but with a positive sign. This is, of course, in keeping with the postulated theory noted in the introductory chapter. This variable may however be seen as a proxy for labour force quality. The rationale behind this is simply that firms with larger plants usually experience higher rates

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[1]All tests of significance will be carried out at the 5 percent level.

[2]The R^2's have everywhere been adjusted for degrees of freedom.

of turnover of workers and in order to be able to fill their continuous vacancies offer higher wages. Now this in itself will not assure a higher quality of labour but the higher wages being offered may also attract such a large pool of reserve labour that the firms may in fact be able to choose their recruits carefully. Thus they may be able to not only fill their recurring vacancies but also obtain higher skilled labour.

One obvious answer to the problem of continuous turnovers may be to reduce the quit rates and this could be carried out to the point where the marginal saving in indirect employment costs in the form of personnel departments equals the increase in direct wage costs involved in reducing the quit rate. The practicality of such a measure is another question.

The only significant factors influencing the 1969 level of earnings are E, M and the proportion of total labour costs to the selling value of factory shipments (L) which has the expected negative impact.

These preliminary results seem to indicate that the only important factors influencing the level of industrial earnings are labour force quality variables, E and M. The plant size variable was significant only for 1962 while the labour ratio variable was significant only for 1969.

Perhaps the most surprising result is the lack of any systematic influence of employment changes. As

noted the 1962 results indicate a negative (significant) influence which is surprising. The measurement of the employment changes may be introducing cyclical factors, this being particularly so for the 1969 variable which was calculated for the period 1967-71.

In fact for both the 1957 and 1969 dates the unemployment rate for Canada was quite high so on that account alone one might anticipate little positive influence on wages. However, the negative sign displayed in both equations (2) and (3) is surprising. An alternative form of the variable will be adopted for use in Chapter III.

Before leaving the discussion of these preliminary results it should be pointed out that nowhere did the union variable display significance. It yielded everywhere the expected positive sign but the fact that it does not appear to be a significant determinant of industrial earnings is unexpected in light of the underlying theory calling for its introduction and use in any such study as this.

Empirical studies, however, have shown that except in the case of new organization, unionism has had little effect on relative wages in industries.[1] Even allowing for this, the fact that unionization had little impact on earnings is surprising.

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[1]For example, Ross and Goldner, op. cit.

The variable capturing labour quality as measured by age, A, shows no significance for any of the years under investigation. In two of the three years it exerts a small positive impact on earnings but in 1969 its impact is seen to be negative. This is, again, a surprising result since it is usual to conclude that experience comes with age and that experience tends to be rewarded.

Before concluding that age is of no significance in determining industrial earnings, it is necessary to point out that the measure used (average age) may not be a perfect proxy for experience and also that experience itself may not capture everything.

Firstly, experience may be less important in some industries than in others, so that a relatively young work force may not be a handicap or a constraint on earnings. Secondly, the average age of the work force says nothing about the length of time each individual worker has been working in that particular industry. Given that labour mobility exists, it is therefore possible that even in industries in which experience is important a relatively older work force may be inexperienced.

Lastly, on-the-job training is of importance particularly in those industries requiring a skilled work force. This training is likely, therefore, to differ across industries and the fact that the average age variable implies that this training is the same across industries means that the variable is mis-specified.

There is a very extensive overlap of skill and experience and in many cases skill is just a by-product of experience in a particular type of work. In fact when an employer seeks an experienced worker what he is looking for is a relatively skilled worker, since successful experience is deemed to be an indication of skill. The behaviour of earnings data classified by years of experience of the earner was presented for engineers in a 1957 study by Blank and Stigler,[1] making it one of the few studies on experience differentials available.

Given that the three labour force quality variables E, M and R were the only significant ones and that all the variables combined were capable of explaining from 75 percent to 88 percent of the variance in earnings among industries, further regressions were run using only those three significant variables. The results are presented on the next page.

From these results it is clear that these three variables can in fact explain much of the inter-industry earnings differentials for the years in question. The major determinants of industrial earnings per hour appear to be the different measures of labour quality. In other words it appears that the differences in earnings among industries are due to differences in labour force quality,

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[1] D.M. Blank and G.J. Stigler, The Demand and Supply of Scientific Personnel , New York, National Bureau of Economic Research, 1957.

TABLE B - REGRESSION RESULTS

t values ( ) d.f. 22

Equation	$\bar{R}^2$	Constant	E	M	R
(4)	.8163	.3109	.0365	.0068	.0071
		(2.4470)	(3.4511)	(4.1130)	(6.2508)
(5)	.8153	.2923	.0509	.0083	.0086
		(1.8331)	(3.8219)	(3.8696)	(5.6025)
(6)	.7622	.5570	.0633	.0145	.0093
		(2.1860)	(3.1012)	(4.6878)	(3.9072)

much in line with the long-run predictions of the competitive hypothesis.

From the results obtained in equations (4) to (6) these labour quality variables alone can explain up to 81 percent of the hourly earnings obtained in an industry. The magnitude of the result is somewhat surprising given that the variables used are but crude measures of labour force characteristics.

Nonetheless these results do appear to minimize the role of demand factors and particularly the role played by employment changes. As reported in the introduction, some previous studies have found employment changes to be an important factor influencing earnings. The preliminary findings here therefore tend to agree with those of the O.E.C.D. study noted previously. It may well be helpful, therefore, to keep in mind the conclusions drawn by the authors of that study with regard to the allocative role of wages. There they noted that labour may be allocated by mechanisms other than changes in wages and that changes in wages may be due to forces other than those that allocate labour.

Seen in this light the failure of employment to be a systematic significant influence on earnings may not be all that strange. Indeed the wage-insensitivity hypothesis gains more credence when the overall economic picture as it existed throughout the period under study is taken into account.

For much of the period the unemployment rate was high and the economy depressed so that it may be reasonable to expect no positive association to exist between earnings and employment changes.

CHAPTER II

SOME MODIFICATIONS: INTRODUCTION OF THE OVERTIME VARIABLE

The results reported in Chapter I seem to imply that the greater part of industrial hourly earnings can be explained by means of labour quality. In this chapter further investigations will be undertaken in an attempt to explore these findings.

As noted in the introductory chapter the purpose of the study is to examine earnings differences among industries. The nature of the data itself dictated the use of hourly earnings rather than hourly wage rates. Given that this is the case and that these average hourly earnings are calculated for each industry by dividing the total weekly wages of hourly-rated wage-earners by the total weekly hours worked by these wage-earners, it is then possible that the average hourly earnings of an industry may be influenced by factors which affect the total weekly wages and the total weekly hours.

By definition total hours include overtime actually worked and the wage-earner total includes part-time wage-earners and casuals working more than the equivalent of one day a week. The inclusion of overtime hours is of obvious significance because average hourly earnings increase with increases in overtime. The fact that such overtime hours may be different for different industries means that a case can be made for including such an overtime variable in the

study. If overtime influences average hourly earnings and if overtime varies among industries then overtime can be considered to be a factor influencing inter-industry earnings differentials.

The overtime variable for each industry (OT) was calculated by taking average weekly hours as a percentage of the unweighted all-industry average. In other words if an industry showed an average higher than the all-industry average it is represented in Table 10 in the Appendix by a figure in excess of 100. Although this measure of overtime may not be ideal, in that it does not show each industry's standard work week in hours, it does tend to distinguish between those industries working relatively longer hours and those working relatively shorter hours.

Such a distinction is, however, made with respect to the all-industry average so that any deviations from this mean are recorded as overtime if the deviations are upwards. That this measure of overtime is not ideal may be indicated by recalling to mind the fact that an industry like textiles working an average of 41.6 hours per week in 1957 was above the all-industry average of 40.9 hours and according to the measure being used worked overtime. However, it may have been the case that this industry had a standard work week in excess of 40.9 hours and in effect worked little real overtime. In other words a more perfect measure of overtime would be calculated for each industry by referring to its own standard work week. This may not,

however, always be feasible since many industries may not operate on a pre-arranged schedule. Such data are not readily available so the measure adopted was then introduced into the argument.

With this variable included, the basic framework was again set up and the regression results are shown in table form on the next page. The results for 1957 from equation (1) once again reaffirm the results of Chapter I. The number of years of schooling, the percentage of males in the work force and the plant size variable are again the significant determinants of industrial hourly earnings. In addition the labour ratio variable L displays a significant negative impact on earnings. These results are, of course, a repetition of those in Chapter I, but with the inclusion of the overtime variable the employment change variable T assumes a positive and an almost significant sign.

This indicates that the level of hourly earnings in 1957 were influenced by the percentage changes in employment occuring at that time.[1] This is the more usual form of relationship suggested by theory which the results in Chapter I seemed to deny. The overtime variable itself, however, displays a negative sign which is almost significant.

Such a negative sign seems to indicate that these

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[1] It will be remembered that the employment change variable covers the period 1955-59.

TABLE C - REGRESSION RESULTS

t values ( ) d.f. $8^a 19^b$

	$\bar{R}^2$	Constant	E	A	M
	.8466	4.1800	.0319	- .0142	.0081
		(2.0628)	(2.6916)	(.6503)	(3.1184)
Eq. (1)	T	OT	U	R	L
	.0274	- .0311	.0007	.0051	- 1.8710
	(1.7892)	(1.8355)	(.2053)	(2.1980)	(2.1990)

	$\bar{R}^2$	Constant	E	A	M
	.9096	4.2490	.0334	- .0132	.0130
		(1.8900)	(2.8141)	(.6290)	(4.8938)
Eq. (2)	T	OT	U	R	L
	- .0136	- .0357	.0017	.0087	- .2546
	(1.7872)	(1.8702)	(.4334)	(4.1690)	(.3220)

	$\bar{R}^2$	Constant	E	A	M
	.8074	6.7755	.0551	- .0597	.0169
		(2.2235)	(2.3486)	(1.3140)	(2.6875)
Eq. (3)	T	OT	U	R	L
	- .0094	- .0365	.0077	.0039	- 3.3340
	(.6163)	(1.4525)	(.9850)	(.8357)	(2.6474)

TABLE C 'Continued'

	$\bar{R}^2$	Constant	E	A	M
	.8510	2.5261	.0329		.0084
		(2.6054)	(3.3568)		(4.5341)
Eq. (4)	T	OT	U	R	L
	.0084	- .0218		.0064	- .7065
	(1.0959)	(2.1739)		(5.8382)	(1.5056)

	$\bar{R}^2$	Constant	E	A	M
	.8987	4.3427	.0397		.0116
		(3.4140)	(3.7619)		(5.7708)
Eq. (5)	T	OT	U	R	L
	- .0055	- .0403		.0076	- .5422
	(1.1132)	(3.1596)		(6.0096)	(.9270)

	$\bar{R}^2$	Constant	E	A	M
	.7916	3.2132	.0591		.0151
		(1.7307)	(3.0734)		(3.8113)
Eq. (6)	T	OT	U	R	L
	.0000	- .0238		.0101	- 2.0704
	(.0006)	(1.1913)		(4.0995)	(2.1293)

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[a]Applies to equations (1) - (3).

[b]Applies to equations (4) - (6).

industries in which overtime was worked were industries with low earnings or alternatively that overtime had a negative effect on earnings. The latter form of the argument is contrary to the theory upon which the inclusion of such a variable was based, and at first sight seems unreasonable.

On the other hand, an examination of Tables 1 and 10 indicates that there is no clear pattern whereby only low-wage industries worked hours in excess of the all-industry average. In fact the data are such that both the high and the low wage industries fall on either side of the average.

If then neither of these two interpretations fit, how does the variable come to show a negative sign? A further discussion of the variable will be delayed, until the equations dealing with 1962 and 1969 have been considered.

Equation (2) shows that the explanatory power is a high of 90 percent while again the significant variables are E, M and R. The overtime variable is significant and negative and the employment change variable is negative once more and almost significant. It thus seems that the 1957 situation, where employment changes exerted a strong positive influence on earnings, has been reversed to one where the employment changes are exerting a strong negative impact on earnings.

The 1969 situation is characterized by a similar conclusion regarding E and M but this time the labour ratio

variable L displays significance while the plant size variable fails to do so. Once more the overtime and employment change variables are negative and not significant.

The introduction of the overtime measure has increased the explanatory power everywhere, but on the whole it has tended to reaffirm the results of Chapter I. The overtime variable itself shows a systematically negative sign which tended towards significance. The use of simple correlation techniques was used to test for a direct relationship between average hourly earnings and the overtime measure.

The 1957 correlation coefficient was $r = .32$ which is both positive and significant indicating that the greater number of hours worked the greater the level of hourly earnings. The results for 1962 show $r = .25$ which is positive but not significant while the results for 1969 show $r = .57$ which is again both positive and significant. Even with the limitations of the straight correlation technique, these results seem to point to a strong positive association in the light of which the systematically negative impact recorded through the regression results are all the more unusual.

So far the average age of the work force and the degree of union organization have failed to show any significance, and consequently these two variables have been temporarily omitted from the framework and the regression results are shown in equations (4)-(6) in Table C. The results,

however, show little change with the same three variables E, M and R showing up once again. The overtime variable remains systematically negative and the employment change variable of relative unimportance.

Table D on the next page, shows the results when only the education, male and plant size variables were used in conjunction with the overtime variable. The results show that from 76 to 88 percent of the variance in average hourly earnings among industries is explained by these four factors. As noted previously the labour force quality representatives, E, M and R are explainable; it is the overtime variable that needs investigation.

One approach is to look at the ranking of industries in terms of average hourly earnings and in terms of overtime. Table E ranks the 36 industries by earnings while Table F ranks those industries in which overtime was worked, i.e. those industries showing percentages in excess of 100 in Table 10 in the Appendix.

For 1957, of the fifteen industries showing overtime seven were industries whose average hourly earnings placed them in the lower half of the earnings structure. In fact, of the top five overtime industries four were low wage industries. In this sense then there is some justification for the negative sign displayed by the overtime variable in the regression results.

Looking at this ranking from another side, ten of the fifteen industries which recorded overtime hours in

TABLE D - REGRESSION RESULTS

t values ( ) d.f. 21

Equation	$\bar{R}^2$	Constant	E	M	R	OT
(1)	.8360	2.1860	.0340	.0090	.0066	- .0200
		(2.2074)	(3.3663)	(4.6532)	(5.9931)	(1.9075)
(2)	.8854	4.6851	.0390	.0127	.0073	- .0456
		(4.0335)	(3.5552)	(6.2034)	(5.8278)	(3.8042)
(3)	.7654	2.7600	.0615	.0174	.0093	.0241
		(1.4160)	(3.0242)	(4.3633)	(3.9324)	(1.1400)

TABLE E - INDUSTRIES RANKED BY AVERAGE HOURLY EARNINGS

1957	1962	1969
Petroleum & coal	Petroleum & coal	Petroleum & coal
Iron & steel	Iron mining	Construction
Iron mining	Iron & steel	Iron mining
Pulp & paper	Smelting	Pulp & paper
Smelting	Pulp & paper	Breweries
Metal mining	Breweries	Iron & steel
Breweries	Printing	Smelting
Printing	Metal mining	Metal mining
Mining	Transportation equipment	Transportation equipment
Paper & allied	Paper & allied	Printing
Transportation equipment	Mining	Aircraft & parts
Aircraft & parts	Distilleries	Paper & allied
Construction	Aircraft & parts	Mining
Chemicals	Construction	Distilleries
Beverages	Chemicals	Beverages
Meat	Meat	Tobacco
Distilleries	Beverages	Meat
Rubber	Rubber	Chemicals
Electrical	Non-metallic minerals	Non-metallic minerals
Non-metallic minerals	Electrical	Rubber
Coal mining	Tobacco	Grains
Tobacco	Grains	Electrical
Grains	Coal mining	Wood
Wood	Wood	Dairy
Dairy	Dairy	Coal mining
Food & beverages	Food & beverages	Soft drinks
Soft drinks	Soft drinks	Food & beverages
Bakeries	Bakeries	Bakeries
Furniture	Furniture	Furniture
Textiles	Textiles	Textiles
Leather	Leather	Leather
Clothing	Clothing	Clothing
Shoes	Shoes	Shoes
Knitting	Knitting	Knitting
Hotels	Hotels	Hotels
Laundries	Laundries	Laundries

Source: Calculated from Table 1 in Appendix.

TABLE F - INDUSTRIES RANKED BY OVERTIME WORKERS

1957	1962	1969
Iron mining	Iron mining	Petroleum & coal
Soft drinks	Non-metallic minerals	Iron Mining
Bakeries	Soft drinks	Non-metallic minerals
Non-metallic minerals	Dairy	Coal mining
Dairy	Furniture	Furniture
Construction	Textiles	Mining
Furniture	Mining	Pulp & paper
Mining	Rubber	Aircraft & parts
Metal mining	Metal mining	Distilleries
Pulp & paper	Grains	Rubber
Grains	Bakeries	Paper & allied
Paper & allied	Transportation equipment	Smelting
Textiles	Petroleum & coal	Textiles
Petroleum & coal	Pulp & paper	Metal mining
Aircraft & parts	Paper & allied	Chemicals
	Chemicals	Transportation equipment
		Grains
		Soft drinks
		Beverages
		Knitting
		Dairy
		Electrical
		Iron & steel
		Meat

Source: Calculated from Table 10 in the Appendix.

1957 fall outside the top 25 percent of the earnings structure which says something about the earnings-overtime relationship which may not be captured by the straight correlation coefficient.

From these observations it appears that even though both the high-wage and the low-wage industries participated in overtime, overtime was more common among the lower-paying industries.

The picture in 1962 is such that seven out of the sixteen industries showing overtime were in the lower half of the earnings structure and five out of the top six overtime industries were similarly placed. The picture is more striking when the top 25 percent of the earnings structure is used as reference, then eleven out of the sixteen industries fall below this figure.

Finally, the 1969 data show that only eleven of the twenty-four industries showing overtime are in the lower half of the earnings structure and four of the top ten overtime industries are in such a position. However, once the hotels, restaurants and taverns industry, which recorded a low average weekly total of 32.3 hours for 1969 and thus drags down the all-industry average, is omitted, thirteen out of the nineteen industries recording overtime are below the top 25 percent of the earnings structure. Even more striking is the fact that six out of the top nine overtime industries are similarly placed.

In the light of these observations the negative

sign recorded by the overtime variable in the regression results is more explainable than seems at first sight. Using this particular measure overtime appears more common among the lower-paying industries. A more likely interpretation, however, may be that these industries worked longer standard hours per week and consequently little real overtime. Such an interpretation casts doubts on the appropriateness of the measure used.

The fact that the OT variable was significantly negative on several occasions in the regression results and yet significant and positively correlated with earnings also leads one to doubt the appropriateness of the variable as formulated. In other words the OT variable changes sign once the effects of the other factors (such as education, age and sex, etc.) on earnings, have been removed in the multiple regressions.

It may then be the case that the OT variable is not representing overtime at all but some other factor or factors, the exact nature of which is far from clear.

CHAPTER III

THE ROLE OF EMPLOYMENT CHANGES REINVESTIGATED

The results to date have indicated that changes in employment have had little influence on industrial earnings. In other words employment changes have failed to be a systematically significant determinant of average hourly earnings among industries.

In this chapter not only will the employment change variables used to date be reconsidered but new measures of employment changes will be introduced into the study.

It will be recalled that the employment change variable generally took on a negative sign which seemed to imply that the disequilibrium process, whereby employment changes in response to wage increases which in turn are brought about by increases in demand for labour, was not operating. A possible interpretation for such a sign may, however, be that this disequilibrium process occurs only on the up side, i.e. when employment changes are positive, and not on the down side when employment changes are negative.

That this may be the case is given some credence by the fact that the results for 1957 show the T variable to be positive but negative for 1962 and 1969, the two years which employment was falling in more industries than was the case for 1957. As noted in Chapter I the method by

which these employment change variables were calculated may be introducing cyclical factors into the analysis and of course for much of the periods in question this cyclical effect had a depressing effect on employment.

In the O.E.C.D. study quoted above, the authors claim that while a rise in relative earnings is not generally indispensable in order to increase labour supply "the stimulus to leave a given employment is evidently greater when earnings there are exceptionally low relative to those in most alternative employments than when earnings in only one or a few other employments are exceptionally high".[1] In this sense then, some form of inverse relationship is postulated where employment changes are made in response to low earnings rather than the more usual case of employment changing in response to positive wage differentials.

An examination of Table E in Chapter II and Table 5 in the Appendix shows that for 1962 the largest decrease in employment took place in coal mining which ranked twenty-third in the earnings structure but the second largest decline took place in distilleries which ranked twelfth. Of the thirteen industries recording declines in employment only four were industries in the lower half of the earnings structure. The suggested hypothesis therefore cannot be considered to be very relevant for the year 1962.

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[1] O.E.C.D., op. cit., pp. 19.

The picture in 1969 is somewhat different in that of the fourteen industries recording declines in employment, ten were placed in the lower half of the earnings structure. Of the nine industries showing the largest declines seven were so placed. These observations seem to make a case for the hypothesis but the fact that such a case is limited to 1969 renders it incapable of being adopted as the systematically correct explanation of employment changes in relation to inter-industry earnings.

Melvin Reder[1] quotes a study carried out by Bowen in which he computed correlation coefficients between percentage changes in average hourly earnings and percentage changes in employment during six subperiods of the interval 1947-59 for twenty manufacturing industries in the U.S. His coefficients showed a positive correlation in the three subperiods in which unemployment was relatively low (less than 4.3 percent) but mixed results in the three subperiods in which unemployment was relatively high.

From these findings Reder draws support for the competitive hypothesis only for the periods in which low unemployment occured where the short-run elasticities of labour supply are more likely to be smaller, thus allowing differential increases in employment to produce differential

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[1] Aspects of Labour Economics, (New York, National Bureau of Economic Research, 1962).

wage changes.

In Table G on the following page the annual average percent unemployment rates for Canada for the period 1955-71 are presented. The employment change variable introduced in Chapter I was calculated for a five year period centered on the three years of study. In other words, the three variables were calculated for the periods 1955-59, 1960-64 and 1967-71. Applying this same procedure to the unemployment rates, Bowen's conclusions can be tested.

The 1957 observation then holds in a period in which the annual average unemployment rate was 5.1 percent which is in excess of the 4.3 percent ceiling set by Bowen. Accordingly this would be considered a period of relatively high unemployment so that there will be no positive association between employment changes and wages. The regression results yielding a positive (but insignificant) sign then disagree with this proposition, for the year 1957 at least.

The period for which the 1962 employment change variable applies was a period in which the annual average unemployment rate was 6.1 percent, again making it a period of relatively high unemployment. As a result, Bowen's theory would predict the absence of any positive association between employment changes and earnings. The regression results show that the employment change variable T, was both negative and significant for 1962; this proposition fails to explain such a result.

TABLE G

ANNUAL AVERAGE PERCENT UNEMPLOYMENT RATE FOR CANADA, 1955-71

Year	Rate
1955	4.3
1956	3.3
1957	4.8
1958	7.1
1959	5.9
1960	7.1
1961	7.1
1962	5.9
1963	5.5
1964	4.7
1965	3.9
1966	3.6
1967	4.1
1968	4.8
1969	4.7
1970	6.0
1971	6.4

Source: Calculated from Seasonally Adjusted Labour Force Statistics, January 1953 - December 1971, D.B.S. Catalogue No. 71-201.

A similar conclusion is drawn for the 1969 variable because it too was negative and the period in question was one of high unemployment, the annual average being 5.2 percent. Thus Bowen's findings, and Reder's interpretation of them, fail to fit the facts as observed in the regression results of Chapters I and II.

The employment change variable for 1969 was redefined to measure the percentage change in employment by industry for the period 1965-68 and the results of the regressions run with this redefined variable included are shown in Table H on the following page.

Equation (1) which includes the new employment change variable plus the seven other variables used previously indicates that only M, the percentage of males in the work force, and L, the labour ratio variable, are significant. This result then is quite surprising in light of the results of Chapters I and II. Although the explanatory power is quite high at 79 percent the inclusion of eight variables limits the degrees of freedom to eight which may explain this odd result.

In equation (2) only the variables E, M, T, OT and R were included and the results show that E, M and R are once again the significant variables. From these results it is therefore clear that the new measure of employment changes still fails to show any significant impact on earnings, and that the three variables which came to the fore in the previous two chapters once again dominate. The

TABLE H - REGRESSION RESULTS

t values ( ) d.f. 8[a] 20[b]

Eq. (1)

$\bar{R}^2$	Constant	E	A	M
.7992	6.8598	.0513	- .0610	.0155
	(2.1594)	(1.0569)	(1.1125)	(2.2880)

T	OT	U	R	L
.0050	- .0361	.0088	.0047	- 3.5400
(.1951)	(1.2690)	(1.0891)	(.8450)	(2.6030)

Eq. (2)

$\bar{R}^2$	Constant	E	A	M
.7628	2.3277	.0711		.0168
	(1.0925)	(3.0663)		(4.1363)

T	OT	U	R	L
- .0078	- .0196		.0104	
(.8777)	(.9002)		(3.8977)	

TABLE H 'Continued'

	$\bar{R}^2$	Constant	E	A	M
	.9186	6.7308	.1060	- .1175	.0089
		(3.3983)	(5.3590)	(3.6762)	(2.3810)

Eq. (3)

	T	OT	U	R	L
	- .0493	- .0170	.0160	.0047	- 4.1783
	(3.4387)	(1.0163)	(3.0936)	(1.7713)	(4.9881)

	$\bar{R}^2$	Constant	E	A	M
	.7585	2.1821	.0717		.0163
		(1.0017)	(2.7368)		(3.7331)

Eq. (4)

	T	OT	U	R	L
	- .0114	- .0186		.0096	
	(.6325)	(.8067)		(3.9268)	

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[a]Equations (1) and (3)

[b]Equations (2) and (4).

overtime variable, OT, also fails to be significant but maintains the negative sign.

The period 1965 to 1968 was a period in which the annual average unemployment rate was 4.1 percent. According to Bowen's analysis this was then a period of relatively high employment, i.e. low unemployment, and as such a positive association should exist between change in employment and wages. The results in Table H do not support the proposition to any great extent - in fact the variable has a negative sign in equation (2). Thus this particular interpretation of the relationship does not seem to hold for the period under study.

Yet another variant of the employment change variable was tried for 1969; this particular form covered the period 1966-69 and the results of the regressions run with this variable included are given in equations (3) and (4) in Table H. The surprising thing about equation (3) is that E, A, M, T, U and L are all significant, A and U both for the first time. According to this result then the percentage change in employment among industries had a strong negative impact on earnings in 1969.

The 1966-69 period was one of relatively low unemployment, the annual average being 4.3 percent, so that contrary to Bowen's proposition and indeed general theory, employment changes even in tight labour markets exert a negative impact on earnings.

The results in equation (4), where the Age, Union

and Labour Ratio variables have been omitted, again indicate that E, M and R are the important determinants, while the results for the employment change variable and the overtime variable indicate that both have a small negative effect on earnings. The overall conclusion therefore must be that these two alternative formulations of the employment change variable shed little additional light on the relationship, if indeed any such relationship exists at all.

Part of the O.E.C.D. study[1] was devoted to an examination of variations in the relationships between changes in earnings and employment and the results of the numerous correlations carried out indicate that higher employment-earnings relationships tend to be more frequently observed in periods of low unemployment than in periods of high unemployment. However, negative coefficients did occur and often enough to make the general conclusion be such that no close and consistent relationship between changes in relative earnings and changes in relative employment could be claimed to exist. Seen in this light therefore the lack of any consistent relationship between employment changes and the level of earnings is not unprecedented.

Up to now the plant size variable has been seen as a labour force quality variable in that larger plants pay higher wages and obtain a higher quality of labour in return. In Chapter I reference was made to the fact that

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[1] Op. cit.

large plants generally have a larger turnover of workers than smaller plants. It may well be the case that for such plants, it is this gross movement of labour that is important and not the changes in employment, which are after all net changes, to which attention has been so far devoted. The results indicate that these net changes have little real impact on earnings so it may be profitable to search elsewhere and given that plant size has been shown to be a systematically significant variable, it may be the place to begin such a search.

The hypothesis that industries which are expanding can increase their labour force without increasing their wages relative to other industries noted above in Chapter I, is in fact made possible by the fact that gross mobility rates are many times greater than the changes in net employment. This of course, means that relatively little change in net employment may occur yet the gross movements of labour may be very large.

A firm with a large plant or plants, facing large turnovers of labour, may be forced to offer relatively higher wages than a corresponding firm with a smaller plant and fewer turnovers in its labour force. This may be caused by the fact that the firm with the large plant may find it necessary to maintain a reserve pool of labour from which it can pick its replacements, and the only way in which it can generate this reserve pool is to offer higher wages or rather the possibility of higher earnings than otherwise

might be the case.

The firm finding itself in such a situation may either be an expanding or a contracting firm and it may consequently be increasing or decreasing net employment over any given period of time. Now the important point is, that regardless of the changes in net employment which the firm is experiencing it may still experience these large changes in turnovers, i.e. gross movements into and out of the labour force, and its wage policy may reflect this latter fact rather than its net employment performance.

If this is in fact the case, then a positive association between earnings and gross flows of employment would exist and there would be little grounds for expecting such a positive association between changes in net employment and earnings. In fact a case can be made for believing that net employment changes and earnings may be negatively associated.

An industry which has shown itself to be a declining industry in terms of employment opportunities may find it has to offer relatively high wages in order to attract and hold its workers, even if the number of workers it requires each year is a smaller number than in the previous year. Such an industry offers little hope to the workers for the future; there is little prospect of security or long-term advancement or promotion so that many workers may choose to move to an industry in which the long-term prospects are brighter and would have to obtain some sort of

premium to induce them to enter or to remain within the declining industry.

During periods of significant unemployment, workers, if they move at all, move to where jobs are available and in fact wage differentials play a secondary role. Surely then the same can be said for workers in declining industries, and that, in other words, earning differentials if they work at all can quite obviously be negatively related with net changes in employment.

It may then be incorrect to look for any clear and systematic relationship between net employment changes and earnings or to assume that wages play an allocative role without recognizing that non-pecuniary factors (security, advancement, etc.) enter the picture and that gross flows of labour are an important factor influencing the wage policy of a firm.

CHAPTER IV

CONCLUSIONS

The results of the various regressions carried out in the first three chapters indicate that labour quality is the main determinant of earnings and that variations in quality account for the differences in earnings among industries.

Labour quality was represented by a crude measure of educational attainment, sex and in part, by plant size. Even with these relatively crude measures of labour quality some 79 to 83 percent of the variance in earnings among industries was explained.

The degree of unionization among industries showed little significance although it should be borne in mind that unionism and plant size are highly correlated and that plant size was seen to be a systematically important factor influencing earnings. The correlation coefficient between unionism and plant size was positive and significant for each of the three years studied,[1] indicating the degree of relationship involved. In this sense then it may be improper to dismiss unionism as a relevant factor, simply because it failed to show significance when used in a particular fashion. Perhaps the correct approach would be to incorporate

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[1]The values were r = .66 for 1957, r = .61 for 1962 and r = .69 for 1969.

it indirectly in some fashion since it appears to influence earnings in an indirect way.

Neither the ratio of labour costs to the selling value of factory shipments nor the average age of the work force seem to play a significant role in determining hourly earnings although the remarks made in Chapter I concerning the age variable need to be kept in mind.

Net changes in employment do not appear to influence earnings in any close or systematic fashion and a more appropriate measure may be gross movements of labour among industries. Such turnovers of labour may be more closely related to actual policies of firms, particularly for firms with large plants, than the longer-term changes in employment which net out these flows.

The variable OT, formulated to represent overtime appears with a negative sign and is significant on occasion. As suggested in Chapter II the variable may well be representing a factor or factors other than overtime, and the manner in which the variable was formulated makes such an occurence not totally unlikely.

In summary then, much of the inter-industry earnings differentials in evidence in 1957, 1962 and 1969 can be explained by differences in the quality of the labour force of each industry and this result stands up through much testing.

The results further suggest that further studies on the allocative role of wages should concern themselves

with the gross flows of labour and with the non-pecuniary (as well as financial) factors influencing such turnovers. Such a study would obviously make the collection and analysis of such gross flow data of prime importance, yet such data are sadly lacking for Canada.

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APPENDIX

TABLE 1

AVERAGE HOURLY EARNINGS IN 36 CANADIAN INDUSTRIES, 1957-69

Industry	Average Hourly Earnings		
	Level 1957 $	Level 1962 $	Level 1969 $
Mining including milling	1.87	2.18	3.28
Metal mining	1.94	2.26	3.38
Food & beverages	1.39	1.65	2.47
Tobacco products	1.52	1.85	3.06
Rubber products	1.66	1.94	2.91
Leather products	1.10	1.27	1.90
Textiles	1.21	1.42	2.21
Paper & allied	1.87	2.23	3.28
Printing, publishing & allied	1.90	2.33	3.31
Furniture & fixtures	1.28	1.49	2.22
Petroleum & coal products	2.23	2.68	3.81
Chemical products	1.73	2.10	2.98
Iron & steel mills	2.16	2.60	3.49
Transportation equipment	1.85	2.24	3.31
Electrical products	1.65	1.92	2.70
Construction	1.84	2.14	3.71
Knitting mills	1.01	1.14	1.70
Clothing	1.06	1.23	1.87
Wood products	1.45	1.71	2.68
Non-metallic minerals	1.62	1.93	2.95
Meat products	1.69	2.06	2.98
Bakeries	1.29	1.54	2.43
Soft drinks	1.31	1.54	2.48
Pulp & paper mills	2.01	2.42	3.57
Smelting & refining	2.01	2.43	3.42

TABLE 1 'Continued'

Industry	Average Hourly Earnings Level 1957 $	Level 1962 $	Level 1969 $
Aircraft & parts	1.84	2.15	3.30
Dairy products	1.39	1.70	2.65
Breweries	1.93	2.36	3.56
Shoes	1.06	1.23	1.84
Distilleries	1.68	2.17	3.27
Iron mining	2.13	2.61	3.58
Coal mining	1.60	1.83	2.59
Grain mill products	1.52	1.84	2.75
Beverages	1.71	2.05	3.08
Laundries, cleaners & pressers	0.90	1.06	1.62
Hotels, restaurants & taverns	0.94	1.07	1.62

Source: Review of Manhours and Hourly Earnings, 1957-67, 1967-69, D.B.S. Catalogue No. 72-202.

TABLE 2

EDUCATION ATTAINMENT BY INDUSTRY, CANADA, 1961

Industry	Percent Completing 4-5 Grades of Secondary School
Mining including milling	7.34
Metal mining	7.40
Food & beverages	7.60
Tobacco products	6.36
Rubber products	7.25
Leather products	4.26
Textiles	5.69
Paper & allied	10.71
Printing, publishing & allied	19.17
Furniture & fixtures	12.28
Petroleum & coal products	13.61
Chemical products	15.19
Iron & steel mills	8.16
Transportation equipment	12.10
Electrical products	10.73
Construction	6.58
Knitting mills	6.42
Clothing	7.33
Wood products	7.32
Non-metallic minerals	8.69
Meat products	9.04
Bakeries	8.00
Soft drinks	10.99
Pulp & paper mills	10.70
Smelting & refining	7.82
Aircraft & parts	9.86

TABLE 2 'Continued'

Industry	Percent Completing 4-5 Grades of Secondary School
Dairy products	8.67
Breweries	10.56
Shoes	3.98
Distilleries	10.56
Iron mining	7.30
Coal mining	7.40
Grain mill products	6.14
Beverages	10.56
Laundries, cleaners & pressers	6.64
Hotels, restaurants & taverns	10.09

Source: Calculated from Occupations by Sex, Showing Age, Marital Status and Schooling, 1961 Census of Canada, D.B.S. Catalogue Number 94-509 (Vol. III - Part I).

TABLE 3

AVERAGE AGE IN YEARS BY INDUSTRY, CANADA, 1961

Industry	Average Age
Mining	35.5
Metal mining	35.5
Food & beverages	37.6
Tobacco	36.5
Rubber	36.0
Leather	36.8
Textiles	34.5
Paper & allied	36.0
Printing, publishing & allied	36.0
Furniture & fixtures	37.5
Petroleum & coal products	33.0
Chemicals	36.0
Iron & steel mills	39.5
Transportation equipment	41.0
Electrical	34.5
Construction	33.5
Knitting mills	33.0
Clothing	38.5
Wood	34.3
Non-metallic minerals	34.5
Meat	35.3
Bakeries	37.0
Soft drinks	37.5
Pulp & paper mills	36.0
Smelting & refining	39.8
Aircraft & parts	34.0
Dairy	34.0
Breweries	37.5

TABLE 3 'Continued'

Industry	Average Age
Shoes	39.5
Distilleries	37.5
Iron mining	35.5
Coal mining	35.5
Grains	37.0
Beverages	37.5
Laundries, cleaners & pressers	37.5
Hotels, restaurants & taverns	38.0

Source: Occupations by Sex, Showing Age, Marital Status and Schooling, Census of Canada, 1961, D.B.S. Catalogue No. 94-509.

TABLE 4

MALE WORKERS AS A PERCENTAGE OF TOTAL INDUSTRY EMPLOYMENT

Industry	1957	1961	1968
Mining[a]	99.96	99.96	99.96
Metal mining[a]	99.96	99.96	99.96
Food & beverages	71.15	72.98	72.68
Tobacco	36.80	47.58	50.05
Rubber	78.29	79.63	82.08
Leather	55.18	53.00	48.38
Textiles	64.15	65.59	63.73
Paper & allied	89.07	89.58	90.09
Printing, publishing & allied	79.90	79.93	78.06
Furniture & fixtures	91.45	89.08	86.14
Petroleum & coal products	99.37	99.33	99.62
Chemicals	83.15	83.64	81.88
Iron & steel mills	95.51	99.38	99.34
Transportation equipment	97.21	95.75	93.29
Electrical	70.50	70.45	64.16
Construction[a]	99.85	99.85	99.85
Knitting mills	30.81	30.99	32.32
Clothing	27.67	25.80	22.21
Wood	94.81	95.95	95.75
Non-metallic minerals	94.18	92.77	93.11
Meat	80.54	80.34	82.37
Bakeries	70.28	71.09	73.19
Soft drinks	92.41	94.36	93.71
Pulp & paper	98.16	98.04	98.13
Smelting & refining	92.17	99.80	99.82
Aircraft & parts	97.24	97.94	97.11
Dairy	94.48	94.31	93.41

TABLE 4 'Continued'

Industry	1957	1961	1968
Breweries	99.38	99.30	99.75
Shoes	51.45	49.01	45.29
Distilleries	64.24	69.59	76.16
Iron mining[a]	99.96	99.96	99.96
Coal mining[a]	99.96	99.96	99.96
Grains	92.87	92.74	95.14
Beverages	87.81	75.91	91.89
Laundries, cleaners & pressers[a]	28.58	28.58	28.58
Hotels, restaurants & taverns[a]	22.98	22.98	22.98

[a]The 1961 Census figures were the only such figures available.

Sources: Calculated from General Review of Manufacturing Industries of Canada, 1957, D.B.S. Catalogue No. 31-201; Manufacturing Industries of Canada, Section A, Summary for Canada, 1961, 1968 D.B.S. Catalogue No. 31-203; 1961 Census of Canada, D.B.S. Catalogue No. 94-509.

TABLE 5

PERCENTAGE EMPLOYMENT CHANGES BY INDUSTRY

Industry	1957[a]	1962[a]	1969[a]	1969[b]	1969[c]
Mining	6.4	- 4.5	10.9	4.5	0.8
Metal mining	5.7	- 5.5	5.9	0.6	- 5.8
Food & beverages	1.9	2.4	10.8	-14.3	- 0.7
Tobacco	- 1.7	1.8	-16.4	2.0	- 1.9
Rubber	5.5	13.0	- 8.4	2.2	0.1
Leather	3.0	5.9	- 4.3	- 1.4	- 4.2
Textiles	1.5	18.2	- 3.8	- 1.2	- 0.2
Paper & allied	3.4	6.8	3.3	5.9	3.6
Printing, publishing & allied	2.3	1.4	1.8	8.5	4.1
Furniture & fixtures	4.7	10.1	6.1	3.3	1.1
Petroleum & coal	2.3	- 4.0	5.8	7.0	4.3
Chemicals	1.9	4.2	- 1.4	6.8	2.8
Iron & steel mills	11.3	9.8	0.6	- 0.9	-13.3
Transportation equipment	0.4	25.8	- 4.2	7.3	4.2
Electrical	6.3	18.1	- 5.1	12.1	5.9
Construction	8.2	- 1.7	6.9	0.8	- 7.6

TABLE 5 'Continued'

Industry	1957[a]	1962[a]	1969[a]	1969[b]	1969[c]
Knitting mills	3.0	1.6	0.8	2.0	0.5
Clothing	2.1	11.1	0.0	- 2.9	- 4.6
Wood	1.7	11.0	12.9	- 4.4	- 0.1
Non-metallic minerals	8.3	10.9	- 2.6	- 3.7	- 4.9
Meat	5.2	- 2.3	4.4	0.9	0.7
Bakeries	1.1	0.9	-11.7	- 6.1	- 7.6
Soft drinks	6.3	8.5	4.2	14.0	4.2
Pulp & paper	2.9	4.7	3.5	3.8	1.2
Smelting & refining	4.0	- 6.9	7.0	7.3	- 2.9
Aircraft & parts	-10.1	6.1	-38.0	31.7	2.8
Dairy	2.2	- 0.5	- 0.2	0.5	- 4.4
Breweries	4.4	- 4.0	14.1	- 1.6	- 1.3
Shoes	3.7	1.2	- 4.2	- 1.1	- 4.1
Distilleries	0.3	- 9.3	6.1	14.9	8.6
Iron mining	11.0	13.9	- 1.3	- 4.1	-13.1
Coal mining	- 8.9	-20.3	- 5.5	3.4	-20.5

TABLE 5 'Continued'

Industry	1957[a]	1962[a]	1969[a]	1969[b]	1969[c]
Grains	- 2.4	- 4.5	7.5	9.4	2.7
Beverages	4.4	- 0.2	8.3	8.8	3.6
Laundries, cleaners & pressers	4.3	- 1.0	-19.6	- 1.6	- 7.0
Hotels, restaurants & taverns	3.6	15.7	36.4	26.3	26.9

[a]The percentage changes were calculated over a five year period centered on the year in question.

[b]Percentage changes calculated over the period 1965-68.

[c]Percentage changes calculated over the period 1966-69.

Sources: Calculated from Review of Employment and Average Weekly Wages and Salaries, 1957-67, 1967-69, D.B.S. Catalogue No. 72-201; Review of Employment and Payrolls, 1956, D.B.S. Catalogue No. 72-201; Employment, Earnings, and Hours, July-Sept. 1971, D.B.S. Catalogue No. 72-002.

TABLE 6

UNION MEMBERSHIP BY INDUSTRY, CANADA, 1957, 1962, 1967

Industry	1948 S.I.C.		1960 S.I.C.	
	1957	1962	1962	1967
Mining & quarrying	59,020	54,900	50,000	57,871
Metal mining	35,486	36,600	32,400	40,482
Food & beverages	50,877	62,400	73,300	82,282
Beverages	8,766	10,500	10,100	10,689
Tobacco products	5,984	5,400	5,400	6,126
Rubber products	14,743	10,300	10,900	15,723
Leather products	9,244	9,800	9,800	12,889
Textiles	33,710	31,100	30,700	38,690
Furniture & fixtures	n.a.	n.a.	9,100	13,211
Paper & allied	63,879	74,100	74,400	75,319
Printing, publishing & allied	23,466	28,300	28,100	30,542
Transportation equipment	98,043	71,000	70,300	123,935
Electrical products	33,418	40,000	42,400	56,680
Petroleum & coal products	3,388	4,700	4,500	3,936
Chemicals	14,749	13,500	14,700	22,024

TABLE 6 'Continued'

Industry	1948 S.I.C. 1957	1948 S.I.C. 1962	1960 S.I.C. 1962	1960 S.I.C. 1967
Knitting mills	n.a.	n.a.	3,200	3,158
Clothing	46,552	47,000	44,100	51,182
Wood products	38,497	33,100	24,500	42,690
Primary metals	n.a.	n.a.	62,200	70,393
Non-metallic minerals	16,925	16,600	17,700	23,143
Construction	140,194	143,800	143,800	209,558

Source: Table IV in Union Growth in Canada, 1921-67, Canada Department of Labour. Catalogue No. L41-970.

TABLE 7

UNION MEMBERSHIP BY INDUSTRY AS A PERCENTAGE OF EMPLOYMENT BY INDUSTRY, CANADA, 1957, 1962, 1969

Industry	1957	1962[a]	1962[b]	1969
Mining*	52.4	53.2	48.5	51.3
Metal mining*	55.7	58.9	52.2	64.9
Food & beverages	26.4	29.6	34.8	35.9
Tobacco products	60.4	48.4	48.4	58.0
Rubber products	66.4	45.1	47.8	58.4
Leather products	29.7	29.7	29.7	40.9
Textile products	49.2	45.8	45.2	50.0
Paper & allied	67.7	73.5	73.8	63.5
Printing, publishing & allied	31.4	37.4	37.1	36.5
Furntiure & fixtures	22.1	24.0	26.4	30.0
Petroleum & coal products	19.0	28.8	27.6	25.1
Chemical products	26.9	21.1	23.0	29.2
Primary metals	53.0	55.4	56.1	62.3
Transportation	67.7	67.7	67.0	82.4
Electrical products	41.0	41.4	43.8	44.4
Construction*	51.5	54.7	54.7	90.6
Knitting mills	11.3	12.7	13.9	13.8
Clothing	51.1	51.2	48.1	52.1
Wood	30.4	39.7	29.4	47.5
Non-metallic minerals	42.2	36.5	38.9	45.1

*Employment was obtained from Employment and Payrolls, 1957, 1962 and Employment and Average Weekly Wages and Salaries, 1967, D.B.S. Catalogue No. 72-002.

[a]Using membership according to 1948 S.I.C.

[b]Using membership according to 1960 S.I.C.

Source: Calculated from Table 6 above; employment figures by industry were obtained from Sources used in Table 5.

TABLE 8

EMPLOYMENT CONCENTRATION INDEXES* FOR CANADIAN INDUSTRIES, 1957, 1961, 1967

Industry	1957	1961	1967
Food & beverages	38.9	38.7	41.6
Tobacco products	88.7	82.9	77.4
Rubber products	90.0	84.1	78.2
Leather products	28.9	32.0	80.7[a]
Textile products	62.5	62.7	61.9
Paper & allied	73.1	73.0	83.5[b]
Printing, publishing & allied	37.8	35.9	39.6
Furniture & fixtures	16.7	15.1	23.3
Petroleum & coal products	64.6	55.6	38.5
Chemical products	48.1	47.0	48.1
Primary metals	92.9	93.7	94.8
Transportation	89.3	84.2	89.3
Electrical products	80.7	75.2	69.9
Construction	n.a.	n.a.	n.a.
Knitting mills	43.6	33.5	35.6
Clothing	21.3	20.9	26.4
Wood	19.6	24.4	29.6
Non-metallic minerals	41.3	35.3	36.4
Meat products	78.8	75.5	73.3[c]
Bakeries	29.8	29.6	31.4[c]
Soft drinks	22.2	24.2	22.1[c]
Pulp & paper	89.5	89.7	90.0
Smelting & refining	91.7	93.1	93.6[c]

TABLE 8 'Continued'

Industry	1957	1961	1967
Aircraft & parts	95.0	92.0	93.3[c]
Dairy products	32.4	27.8	23.4
Breweries	38.9	38.7	41.6
Shoes	38.6	38.0	48.6[c]

*The percentage of total employees in the industry working in establishments of 200 or more employees.

[a]1967 data was used for establishments employing 50 and more.

[b]1967 data was used for establishments employing 100 and more.

[c]Using 1966 data.

Sources: Calculated from General Review of the Manufacturing Industries of Canada, 1957, D.B.S. Catalogue No. 31-201; Type of Ownership and Size of Establishment Engaged in Manufacturing in Canada 1961, D.B.S. Catalogue No. 31-210; Annual Census of Manufacturers, Preliminary Bulletin - Size of Establishment 1967, Catalogue No. 31-201P.

TABLE 9

RATIOS OF LABOUR COSTS IN CANADIAN INDUSTRIES 1957, 1962, 1969

Industry	Ratios of Wages* to Selling Value of Factory Shipments 1957	1962	1969
Food & beverages	0.104	0.082	0.087
Tobacco products	0.106	0.092	0.089
Rubber products	0.178	0.187	0.165
Leather products	0.255	0.244	0.252
Textile products	0.191	0.167	0.166
Paper & allied	0.163	0.158	0.169
Printing, publishing & allied	0.221	0.212	0.208
Furniture & fixtures	0.241	0.233	0.235
Petroleum products	0.035	0.033	0.035
Chemical products	0.102	0.091	0.100
Primary metals	0.197	0.192	0.177
Transportation	0.185	0.159	0.129
Electrical products	0.175	0.167	0.170
Construction	n.a.	n.a.	n.a.
Knitting mills	0.233	0.203	0.200
Clothing	0.220	0.224	0.241
Wood	0.217	0.214	0.204
Non-metallic minerals	0.189	0.186	0.191
Meat	0.078	0.073	0.070
Bakeries	0.250	0.146	0.175
Soft drinks	0.096	0.093	0.089
Pulp & paper	0.168	0.164	0.176
Smelting & refining	0.080	0.074	0.170

TABLE 9 'Continued'

Industry	Ratios of Wages* to Selling Value of Factory Shipments 1957	1962	1969
Aircraft & parts	0.248	0.217	0.233
Dairy products	0.107	0.054	0.057
Breweries	0.110	0.101	0.107
Shoes	0.255	0.244	0.252
Distilleries	0.099	0.076	0.069

*Wages are for production and related workers only.

Sources: Calculated from General Review of the Manufacturing Industries of Canada, 1957, D.B.S. Catalogue No. 31-201; Manufacturing Industries of Canada, Section A, Summary for Canada, 1962, D.B.S. Catalogue No. 31-203; Annual Census of Manufactures, Preliminary Bulletin, 1969, D.B.S. Catalogue No. 31-201P.

TABLE 10

AVERAGE WEEKLY HOURS OF HOURLY RATED WAGE-EARNERS BY INDUSTRY AS A PERCENTAGE OF THE INDUSTRY AVERAGE

Industry	1957	1962	1969
Mining	103.4	102.2	103.5
Metal mining	103.2	101.7	101.8
Food & beverages	99.3	98.8	98.5
Tobacco	97.6	96.6	92.5
Rubber	98.3	102.2	102.8
Leather	96.8	98.3	96.0
Textiles	101.7	103.2	102.0
Paper & allied	101.7	100.7	102.8
Printing, publishing & allied	97.3	94.9	94.8
Furniture & fixtures	103.4	104.4	103.8
Petroleum & coal	101.2	101.2	107.3
Chemicals	100.0	100.5	101.8
Iron & steel mills	99.5	98.8	100.3
Transportation equipment	96.8	101.5	101.5
Electrical	98.8	100.0	100.3
Construction	103.7	99.8	99.5
Knitting mills	97.3	100.0	100.5
Clothing	89.7	91.9	91.3
Wood	97.8	99.5	98.3
Non-metallic minerals	104.4	105.1	106.0
Meat	97.8	99.5	100.3
Bakeries	104.9	101.5	98.0
Soft drinks	105.9	104.9	101.3
Pulp & paper mills	102.0	101.0	103.5
Smelting & refining	99.0	98.3	102.3
Aircraft & parts	100.2	100.0	103.3

TABLE 10 'Continued'

Industry	1957	1962	1969
Dairy	104.2	104.4	100.5
Breweries	98.0	96.8	99.8
Shoes	95.4	97.8	96.3
Distilleries	96.1	99.5	102.8
Iron mining	110.3	107.4	106.8
Coal mining	96.6	98.8	104.8
Grains	102.0	101.7	101.5
Beverages	98.8	100.0	101.0
Laundries, cleaners & pressers	97.8	98.0	93.5
Hotels, restaurants & taverns	98.0	93.1	80.8

Sources: Calculated from Review of Man-hours and Hourly Earnings, 1957-67, 1967-69, D.B.S. Catalogue No. 72-202.